

April 19, 2016

**Ex Parte**

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, SW  
Washington, DC 20554

Re: *Connect America Fund*, WC Docket No. 10-90; *Universal Service Reform Mobility Fund*, WT Docket No. 10-208

Dear Ms. Dortch,

On April 15, 2016, Tina Pidgeon and Chris Nierman of General Communication, Inc. (“GCI”) and I met with Jim Schlichting, Sue McNeil, Chris Helzer, Peter Trachtenberg, Claire Wack, and Matthew Warner of the Wireless Telecommunications Bureau, and Alexander Minard of the Wireline Competition Bureau about the above-captioned proceedings.

The GCI attendees provided material in response to questions previously asked by FCC staff. First, GCI explained the methodology used to ascertain which census blocks were “served” by AT&T or Verizon using their own facilities to offer 4G LTE service, and which areas would not be eligible for future support under the Alaska Plan. GCI overlaid the coverage shapefiles from the most recent Form 477 data, as of December 31, 2014, with the “populated portions” of 2010 census blocks in Remote Alaska (as defined by Commission rules) to compute the percentage of the population in each census block that is covered by each provider and technology. The “populated portions” of census blocks were estimated based on proximity to roads and the existence of non-governmentally owned land in an attempt to better approximate the actual locations of population within large census blocks. Consistent with the threshold adopted in the Rate of Return Reform Order for assessing overlap of a wireline rate-of-return carrier by an unsubsidized competitor,<sup>1</sup> a census block was classified as served by AT&T LTE or Verizon Wireless LTE (and thus excluded from Remote Alaska base population) if 85% of the population is covered by the AT&T or Verizon Wireless LTE Form 477 shapefiles.

Once these census blocks “served” by AT&T or Verizon LTE were excluded from the Remote Alaska base population, GCI next explained its methodology for estimating the population of the remaining “served” census blocks. The calculation of remaining served census blocks eligible for support provides the basis upon which performance commitments are made.

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<sup>1</sup> See *Connect America Fund*, Report and Order, Order on Reconsideration, and Further Notice of Proposed Rulemaking, FCC 16-33, 47 ¶ 121 (2016).

To identify served census blocks, and to avoid the situation in which a single person in a census block would render that entire block “served,” a census block was deemed to be served if the analysis demonstrated that 15% or more of the population in that block was within any carrier’s coverage polygon, regardless of the level of service (i.e., including voice, 2G data, 3G data, or LTE). A block was categorized as “unserved” if less than 15% of the population in that block was within any carrier’s coverage polygon. By this methodology, the total population of “served” census blocks in Remote Alaska, not counting those served at least 85% by AT&T or Verizon with 4G LTE over their own facilities, is approximately 144,000, based on 2010 Census population counts.<sup>2</sup>

The line demarking “served” from “unserved” census blocks is important in the Alaska Plan because “served” blocks are upgraded through carrier performance obligations, while “unserved” blocks are the subject of a reverse-auction mechanism. Thus, the Commission may choose to draw the line between “served” and “unserved” at a different level than 15%.

The population in the Remote Alaska areas subject to the Alaska Plan is the basis for GCI’s revised proposed performance commitments, presented in the meeting and attached here as Attachment A. While the population totals remain preliminary and are subject to refinement, Attachment A reflects a commitment to move all fiber-backhaul areas, and the substantial majority of microwave-backhaul population, to LTE within ten years. Moreover, GCI will be implementing LTE-over-satellite to approximately half of the population served by satellite backhaul, and will be moving at least 3,000 POPs from satellite backhaul to microwave. GCI further explained that its commitments reflect the expansion and upgrade of its TERRA microwave network. GCI is working to confirm the anticipated downlink and upload speeds, but is targeting 2 Mbps downlink and 800 kbps uplink for the vast majority of the LTE-served POPs. GCI also stated that it would be willing to review its commitments at or about five years into the Alaska Plan so that they could be revised to reflect the intervening development of middle-mile facilities.

GCI also provided the attached charts (Attachment B), which estimate the population of Alaska Plan-eligible census blocks in which 85% of the population is served by each of two or more carriers. The charts break out these overlaps by service level (voice, 3G or LTE) and, for voice and 3G, by air interface family.

Finally, we urged that the Commission adopt the Alaska Plan rules and approve the carriers’ performance plans in the same order, if at all possible. The Commission should nonetheless delegate authority to the Wireline and Wireless Bureaus respectively to make adjustments to the performance plans, as needed, as well as to conduct any five-year review. This would provide necessary flexibility, while allowing the Alaska Plan – for both its wireline and wireless components – to be implemented quickly and cohesively, including with respect to its budgetary aspects. Such an approach would also ensure that the Alaska rate-of-return ILECs would be able to choose between the Alaska Plan, A-CAM-based support, and Connect America Fund Broadband Loop Support, with a full understanding of all alternatives.

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<sup>2</sup> Total Remote Alaska population is approximately 377,000.

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In further response to staff request, GCI is attaching hereto as Attachment C a simplified explanation of its LTE-over-satellite solution. Also, we noted that the Alaska Telephone Association was separately filing a revised copy of proposed implementing rules.<sup>3</sup>

Please do not hesitate to contact me if you have any questions regarding this matter.

Sincerely,



John T. Nakahata  
*Counsel to General Communication, Inc.*

cc: Jim Schlichting  
Sue McNeil  
Chris Helzer  
Peter Trachtenberg  
Claire Wack  
Alexander Minard  
Matthew Warner

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<sup>3</sup> See Letter from Christine O'Connor, Executive Director, Alaska Telephone Association, to Marlene H. Dortch, Secretary, FCC, WC Docket No. 10-90 (filed Apr. 18, 2016).

# **Attachment A**

GCI Draft Proposed Alaska Plan Performance Commitments - April 15, 2016

		Current Base Population	Current % Served	Year 5 Base Population	Year 5 % Served	Year 10 Base Population	Year 10 % Served
Fiber	LTE	5003	8%	17003	26%	65482	100%
Fiber	3G	49095	75%	37095	57%	0	0%
Fiber	Voice	11384	17%	11384	17%	0	0%
Fiber Total		65482	100%	65482	100%	65482	100%
Microwave	LTE	0	0%	0	0%	39455	83%
Microwave	3G	15372	35%	39372	83%	8074	17%
Microwave	Voice	29157	65%	8157	17%	0	0%
Microwave Total		44529	100%	47529	100%	47529	100%
Satellite	LTE	0	0%	13000	49%	13000	49%
Satellite	3G	973	3%	973	4%	973	4%
Satellite	Voice	28348	97%	12348	47%	12348	47%
Satellite Total		29321	100%	26321	100%	26321	100%
Total	LTE	5003	4%	30003	22%	117937	85%
Total	3G	65440	47%	77440	56%	9047	6%
Total	Voice	68889	49%	31889	23%	12348	9%
Grand Total		139332	100%	139332	100%	139332	100%

# **Attachment B**

Providers Serving POP/Census Blocks by Carrier and ILEC Study Area

Notes:

Excludes areas served by Verizon or AT&T LTE at 85% of the census block.

Total Non-ATTVZLN LTE served population is 149,610, blocks are 4783.

Total Non-ATTVZLN LTE served population is 143,991 and blocks are 4161, assuming a served block is one with coverage of 15% or more of the population.

Total Non-ATTVZLN LTE served population is 133,323 and blocks are 3714, assuming a served block is one with coverage of 85% or more of the population.

Overlap analysis based on 85% Non-ATTVZLN LTE served population threshold.

Population		ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TEL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU SCA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSKAGA ELEC & TEL	OTZ TEL COOPERA TIVE	SUMMIT TEL & TEL AK	UNITED TEL UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total	
All Count Population		1142	585	768	1822	157	574	63	3	1006	4298	2	1824	2	522	4	522	4	522	4	522	4	522	4	522	4
ATT	ASTAC																									
ATT,CopperValley	ATT,MTA																									
CopperValley	GCI	3	2499	254	1745				1061	1361		177	611	40	1694				2232	2260	1	25325	412	26	814	43905
GCI,ASTAC	GCI,ASTAC						6060					6												89	6149	987
GCI,ASTAC,ATT	GCI,ATT						987																		1810	48642
GCI,ATT,CopperValley	GCI,ATT,MTA		3217	23267	9798	8412					164	5396		12	2	1585					217	1	157	64	12	5472
GCI,CopperValley	GCI,CopperValley															230									230	4451
GCI,CopperValley,Cordova	GCI,Cordova											192	1259												363	363
GCI,OTZ	GCI,OTZ												363												658	658
GCI,TelAlaska	GCI,TelAlaska													4968						4698				815	4698	8340
GCI,TelAlaska,ATT	GCI,TelAlaska,ATT												733												3618	4351
GCI,WindyCity	GCI,WindyCity					72																			72	72
MTA	MTA																								12	12
TelAlaska	TelAlaska																								328	507
TelAlaska,ATT	TelAlaska,ATT																								2	24
Served Population @ 85% Threshold		3217	24412	13540	326	10925	8869	1061	1361	6614	2233	5936	1696	2405	6193	2232	6958	281	25329	633	9102	133323				
Served Population @ 15% Threshold		3311	24848	13763	326	11569	9003	0	1061	1361	0	6951	2256	6792	2109	6237	6370	0	2242	7158	314	25850	633	11837	143991	
Total Remote Alaska Eligible POPs		3312	24889	15161	326	11847	9003	198	1061	1541	56	7009	2264	6900	2116	6290	6383	146	2242	7158	324	26599	633	14252	149610	

Providers Serving POP/Census Blocks by Carrier and ILEC Study Area

CDMA Population	ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TEL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGA K ELEC & TEL	OTZ TEL TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
CopperValley	2635	21460	10210		9927	5500					726	1529	426	1673	1302	3616				136	85	157	1989	59314
GCI											198				49							64	12	5468
GCI,CopperValley											5392													49
GCI,MTA																								197
Unreserved	582	2952	3330	326	998	3369		1061	1361		298	704	5510	23	857	2577		2232	6958	145	25244	412	7075	66014
Population @ 85% Threshold	3217	24412	13540	326	10925	8869		1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323

GSM Population	ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TEL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGA K ELEC & TEL	OTZ TEL TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
ASTAC																								90
ATT	30	2788	1956		3145						2826		40	1694	1366					86	4		1397	2213
GCI				254	1531			1061	1361		198	1259						2232	2260	25241	412	4729	1	1397
GCI,ASTAC		3	2306			5759																		5760
GCI,ASTAC,ATT						987																		987
GCI,ATT	3187	21621	8427	6035							3413	363	12	2	1027			194				221	1431	45570
GCI,Cordova			658																4698					1021
GCI,OTZ																								4698
GCI,TelAlaska																								8340
GCI,TelAlaska,ATT																								4330
GCI,WindyCity																								72
TelAlaska				72																				328
TelAlaska,ATT																								507
Unreserved			193		214						177	611	161	43	12						1	84	2	45
Population @ 85% Threshold	3217	24412	13540	326	10925	8869		1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323

3G Population	ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TEL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGA K ELEC & TEL	OTZ TEL TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
ATT																								1202
ATT,CopperValley			1456		2158						419		144		1592						117	1		12
CopperValley											2893													2905
GCI											268	1529												26
GCI,ATT		10	502		1558																			26
GCI,ATT,CopperValley		3187	20721	8695	7002	987													2056		5440	1	913	12310
GCI,ATT,MTA											2927		551	2	688						163	156	1454	43606
GCI,CopperValley																								2991
MTA											30				113									113
TelAlaska																								30
Unreserved			122	2887	207	7882		1061	1361						12									12
Population @ 85% Threshold	3217	24412	13540	326	10925	8869		1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323



Providers Serving POP/Census Blocks by Carrier and ILEC Study Area

	ACS-FAIRBANKS INC	ACS-N GLACIER BANK	ADAK TEL UTILITY	ADAK TEL ALASKA	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGAK ELEC & TEL	OTZ TEL COOPERATIVE	SUMMIT TEL & UTILITIES AK	UNITED TEL CO INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
3G CDMA Population																							
CopperValley	1408	16538	8211	7455	987					3161	1529	405	1002	4					16		156	38	4728
GCI										2957											362		3021
MTA														125							64		125
Unreserved	1809	7874	5329	326	3470	7842	1061	1361		496	704	5531	694	2276	6193		2232	6958	265	25329	413	8702	88905
Population @ 85% Threshold	3217	24412	13540	326	10925	8869	1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323

	ACS-FAIRBANKS INC	ACS-N STATE	ADAK TEL UTILITY	ADAK TEL ALASKA	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGAN ELEC & TEL	OTZ TEL COOPERATIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL & TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
3G GSM Population																							
ATT	30	8693	1895	4802						6239	144			1596					117		1	1263	24780
GCI												4	1694				2056			5440	1	695	11835
GCLATT	3187	15587	8256	1531	947							551	2	797					163		220	1405	35513
TelAlaska											2527												2527
Unreserved	129	2978	326	234	7842	1061	1361			375	2233	2710		12	6193		176	6958	1	19888	412	5739	58648
Population @ 85% Threshold	3217	24412	13540	326	10925	8869	1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323

	ACS-FAIRBANKS INC	ACS-N STATE	ADAK TEL UTILITY	ADAK TEL ALASKA	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU SKA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSHAGAN ELEC & TEL	OTZ TEL COOPERATIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL & TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
LTE Population																							
CopperValley	144	2								5957	2211	4										13	8121
GCI																						435	565
Unreserved	3073	24410	13540	326	10925	8869	1061	1361		657	22	5932	1696	2405	6193		2232	6958	281	25329	633	8674	124577
Population @ 85% Threshold	3217	24412	13540	326	10925	8869	1061	1361		6614	2233	5936	1696	2405	6193		2232	6958	281	25329	633	9102	133323

Census Blocks		ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TEL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO	KETCHIKAN PUBLIC UT	MATANUSKA TEL ASSOC	NAUKULUK TEL CO INC	NORTH COUNTRY TEL CO	NUSKAGA TEL	OTZ TEL COOPERATIVE	SUMMIT TEL & TEL AC	UNITED UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total
All Count Blocks																									
ATT		19	16	36	37	15	35	3	1	30	155														
ASTAC																									
ATT,CopperValley																									
ATT,MTA																									
CopperValley																									
SGI		1	111	3	73	148	7		80	55															
GLASTAC																									
GLASTAC,ATT																									
GL,ATT		61	504	200		381																			
GL,ATT,CopperValley																									
GL,ATT,MTA																									
GL,CopperValley																									
GL,CopperValley,Cordova																									
GL,Cordova																									
GL,LOTZ																									
GL,TelAlaska																									
GL,TelAlaska,ATT																									
GL,WindyCity																									
MTA																									
TelAlaska																									
TelAlaska,ATT																									
Served Blocks @ 85% Threshold		61	524	349	10	490	192		80	55		250	59	185	37	130	240		66	169	25	583	43	166	3714
Served Blocks @ 15% Threshold		72	563	363	10	525	193		80	55	0	283	63	193	43	298	248		68	172	31	596	43	262	4161
Total Remote Alaska Eligible CBs		73	576	474	10	554	193	23	80	78	6	302	64	197	46	324	251	28	68	172	36	689	43	496	4783



	ACS-FAIRBANKS INC	ACS-N GLACIER STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU ISA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSKAGAM K ELEC & TEL	OTZ TEL COOP & TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total	
3G CDMA Blocks																									
CopperValley	26	354	180		364	7						159	51	35	26	3					2		1	6	216
GCI																								8	1006
GCI CopperValley											59												5		64
MTA																									7
Unreserved	35	170	169	10	126	185		80	55		32	8	150	11	120	240		66	169	23	583	37	152		2421
Blocks @ 85% Threshold	61	524	349	10	490	192		80	55		250	59	185	37	130	240		66	169	25	583	43	166		3714

	ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU ISA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSKAGAM & ELEC & TEL	OTZ TEL COOP & TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total	
3G GSM Blocks																									
ATT	1	317	61		178						207		7			116					5	1	48		941
GCI																									
GCI ATT																									
TelAlaska	60	201	143		238	7							23	1	12						19		6	11	721
Unreserved	5	125	10	23	185			80	55		43	59	125	29		2	240		13	169	1	511	36	91	1773
Blocks @ 85% Threshold	61	524	349	10	490	192		80	55		250	59	185	37	130	240		66	169	25	583	43	166		3714

	ACS-FAIRBANKS INC	ACS-N STATE	ACS-N SITKA	ADAK TEL UTILITY	ALASKA TEL CO	ARCTIC SLOPE TEL INC	BETTLES TEL CO	BRISTOL BAY TEL COOP	BUSH-TELL INC	CIRCLE UTILITIES	COPPER VALLEY TEL	CORDOVA TEL COOP INC	INTERIOR TEL CO INC	KETCHIKAN PUBLIC UT	MATANU ISA TEL ASSOC	MUKLUK TEL CO INC	NORTH COUNTRY TEL CO	NUSKAGAM K ELEC & TEL	OTZ TEL COOP & TIVE	SUMMIT TEL & TEL-UTILITIES AK	UNITED TEL-UTILITIES INC	YUKON TEL CO INC	Study Area Unknown	Grand Total	
LTE Blocks																									
CopperValley	7	1									210	57											2	269	
GCI													1										10		
Unreserved	54	523	349	10	490	192		80	55		40	2	184	37	130	240		66	169	25	583	43	163		3435
Blocks @ 85% Threshold	61	524	349	10	490	192		80	55		250	59	185	37	130	240		66	169	25	583	43	166		3714

# **Attachment C**

## Attachment C

### LTE-Over-Satellite

The existing cellular network in the satellite-served communities provides voice, SMS, MMS, and 2G EDGE data services through the use of Star Solutions remote MSCs (mobile switching centers) and Vanu, Inc. software-defined radios and BSCs (base station controllers). All communities are connected to the core network in Anchorage over satellite backhaul, provided through existing GCI-owned earth stations. The core network in Anchorage consists of a gateway MSC (a gateway MSC to the rural network), GCI's wireless network centralized HLR, and core GSM (shared with UMTS) data platforms (SGSN and GGSN).

GCI plans to upgrade to 4G data speeds through a distributed core LTE system. In each of these communities, GCI will add both an eNodeB (Evolved Node B), which interacts with user handsets, and a remote EPC (Evolved Packet Core), which provides control and gateway functions for the new LTE system,. This distributed architecture also provides an interface between the remote GSM and LTE equipment (the SGs interface between the MSC and the EPC's MME) so that circuit-switched fallback is supported in each village, just as GCI currently does in its urban wireless implementations of LTE. This architecture will also allow GCI to provide local call functionality in a standalone mode if satellite or other outages disrupt connectivity to the core network in Anchorage. For each satellite-served village, GCI plans to add a remote EPC and one or more eNodeBs to each served community to provide 4G data service, and also to add antennas to existing towers for spatial diversity as necessary to improve coverage in the existing coverage area.

GCI's proposed 4G EPC-LTE deployment will install in each village all components of an EPC and LTE network, except the centralized HSS (Home Subscriber Server), which is located in Anchorage. Bench testing performed by one of GCI's vendors indicates that the extension of the HSS link through the S6a interface over satellite is viable. GCI's HSS provider also concurs that the S6a interface works over geo-stationary satellite links. Connection between each village's remote EPC and the Internet will be achieved with standard 3GPP (3<sup>rd</sup> Generation Partnership Project) IP interface (via the SGi interface) , with which GCI has extensive experience. GCI uses a wide variety of transmission methods and systems such as satellite link acceleration, payload and header compression, and link optimization to deliver TCP/IP throughputs at speeds in excess of 15 Mbps. GCI is not aware of any deployments using this specific combination of technologies and systems, but multiple vendors have come forth with proposals to provide this type of "EPC-in-a-Box" system solution. With this technical solution, GCI plans to target throughputs from the remote base stations to the end user in these communities of 7 Mbps download with a reference signal received power (RSRP) of -108 dBm, both speed and power as measured outdoors. The end user, however, could easily register lower download speeds depending on the actual radio frequency path, the

## **Attachment C**

system loading, and the availability and cost of backhaul. GCI believes that under normal operating conditions that end users will expect to experience speeds of 2 Mbps download and 800 kbps upload.